

# **Tracking Analysis Of The NLMS Algorithm In The Presence Of Both Random And Cyclic Nonstationarities**

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## **Summary**

Tracking analysis of the normalized least mean square (NLMS) algorithm is carried out in the presence of two sources of nonstationarities: 1) carrier frequency offset between transmitter and receiver; 2) random variations in the environment. A novel approach to this analysis is carried out using the concept of energy conservation. Close agreement between analytical analysis and simulation results is obtained. The results show that, unlike in the stationary case, the steady-state excess MSE is not a monotonically increasing function of the step size. Moreover, the ability of the adaptive algorithm to track the variations in the environment is shown to degrade with increasing frequency offset.

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